



# Sunspot Index and Long-term Solar Observations

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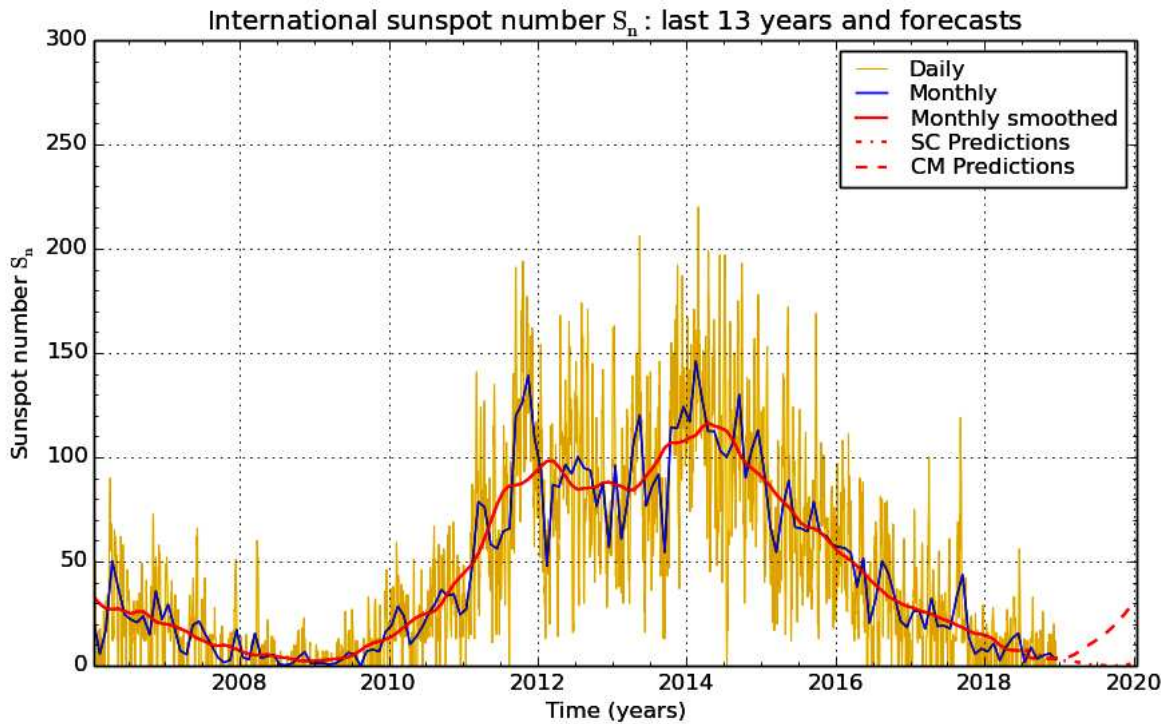
## ***SUNSPOT BULLETIN*** 2018 n° 12

Provisional international and normalized hemispheric daily sunspot numbers for December 2018

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Computed at the *Royal Observatory of Belgium* using observations from an international network with the *Specola Solare Ticinese Locarno* as reference station.

Date	$S_n$	$S_n(N)$	$S_n(S)$
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	17	0	17
6	20	0	20
7	18	0	18
8	6	0	6
9	0	0	0
10	0	0	0
11	12	12	0
12	0	0	0
13	0	0	0
14	11	11	0
15	12	12	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
Monthly mean	3.1	1.1	2.0
Cooperating stations	67	52	52



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2019 January 1

**Predictions of the monthly smoothed Sunspot Number**  
 using the last provisional value, calculated for June 2018: 7.3 ( $\pm 5\%$ )

	SM	CM		SM	CM		SM	CM
2018 Jul	7	5	2019 Jan	3	4	2019 Jul	0	13
Aug	7	4	Feb	2	4	Aug	0	16
Sep	6	4	Mar	2	5	Sep	0	18
Oct	5	3	Apr	1	7	Oct	0	21
Nov	4	3	May	1	9	Nov	1	25
Dec	3	4	Jun	1	11	Dec	1	28

**SM : SIDC classical method** : based on an interpolation of Waldmeier's standard curves. The estimated error ranges from 7% (first month) to 35% (last month)

**CM : Combined method** : the combined method is a regression technique coupling a dynamo-based estimator with Waldmeier's method of standard curves, designed by K. Denkmayr.

Ref.: K. Denkmayr, P. Cugnon, 1997 : "About Sunspot Number Medium-Term Predictions", in "Solar-Terrestrial Prediction Workshop V", eds. G.Heckman et al., Hiraiso Solar Terrestrial Research Center, Japan, 103.

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*The SILSO team wishes you a happy and sunny new year !*

**Summary of the URSIGRAMs from S.I.D.C.**

Date	S <sub>n</sub>	PPSI	600	2800	COS	SFI	XI	Ak
30	0	0	-	68	////	0	0/0	(//)
1	0	0	-	69	////	0	0/0	8
2	0	0	-	69	////	0	0/0	14
3	0	0	-	68	////	0	0/0	8
4	0	0	-	69	////	0	0/0	8
5	17	6	-	71	////	0	0/0	6
6	20	6	-	70	////	0	0/0	5
7	18	5	-	70	////	0	0/0	11
8	6	2	-	71	////	0	0/0	12
9	0	0	-	72	////	0	0/0	12
10	0	0	-	71	////	0	0/0	11
11	12	1	-	71	////	0	0/0	10
12	0	3	-	71	////	0	0/0	6
13	0	0	-	70	////	0	0/0	2
14	11	4	-	71	////	0	0/0	1
15	12	0	-	71	////	0	0/0	1
16	0	0	-	70	////	0	0/0	2
17	0	0	-	70	////	0	0/0	6
18	0	0	-	70	////	0	0/0	8
19	0	0	-	70	////	0	0/0	6
20	0	0	-	70	////	0	0/0	13
21	0	0	-	71	////	0	0/0	6
22	0	0	-	71	////	0	0/0	2
23	0	0	-	70	////	0	0/0	2
24	0	0	-	70	////	0	0/0	4
25	0	0	-	70	////	0	0/0	4
26	0	0	-	69	////	0	0/0	2
27	0	0	-	69	////	0	0/0	4
28	0	0	-	69	////	0	0/0	27
29	0	0	-	69	////	0	0/0	12
30	0	0	-	69	////	0	0/0	12
31	0	0	-	69	////	0	0/0	7

**S<sub>n</sub>** : provisional international sunspot numbers from the S.I.D.C.

**PPSI** : prompt photometric sunspot index from the S.I.D.C. in  $10^{-5} \text{ w/m}^2$  : the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.

**600** : 600 Mhz solar flux from the station at Humain (Belgium).

**2800** : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

**COS** : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).

**SFI** : Solar Flare Index from the S.I.D.C. (origin: Ursigrams - UGEOR, evaluation :  $1 \times S_n + 10 \times "1" + 100 \times ">1"$ ).

**XI** : X-flares index from the Ursigrams (M-flares/X-flares) (origin: Ursigrams - UGEOR, UGEOI).

**Ak** : geomagnetic index from Wingst, Germany (origin: Ursigrams).

SOLAR PHYSICS DEPARTMENT

UCCLE DAILY PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR DECEMBER 2018

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH			
4	955	0	0	0	0	0	0.0	3	BB
10	1040	0	0	0	0	0	0.0	2	BB
11	1235	1	1	11	11	0	1.3	3	BB
12	1020	0	0	0	0	0	0.0	3	BB
13	1000	0	0	0	0	0	0.0	3	OL
14	1300	1	2	12	12	0	0.7	3	OL
15	1325	1	2	12	12	0	0.3	2	OL
17	1100	0	0	0	0	0	0.0	2	BB
18	1200	0	0	0	0	0	0.0	2	BB
19	1225	0	0	0	0	0	0.0	3	SB
22	1030	0	0	0	0	0	0.0	1	OB
24	1430	0	0	0	0	0	0.0	1	FC
25	1020	0	0	0	0	0	0.0	3	FC
26	1030	0	0	0	0	0	0.0	1	OB
27	1030	0	0	0	0	0	0.0	2	OB

The relative mean sunspot number is 2.3.

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NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR DECEMBER 2018

$K' = 1.184 (*)$

1	***	7	***	13	0	19	0	25	0
2	***	8	***	14	14	20	***	26	0
3	***	9	***	15	14	21	***	27	0
4	0	10	0	16	***	22	0	28	***
5	***	11	13	17	0	23	***	29	***
6	***	12	0	18	0	24	0	30	***
								31	***

The normalised relative monthly mean sunspot number is 3.

(\*)  $K'$  is the mean of the monthly  $K'$  for the last five years.

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The Sun has been observed 15 days on 31 possible.